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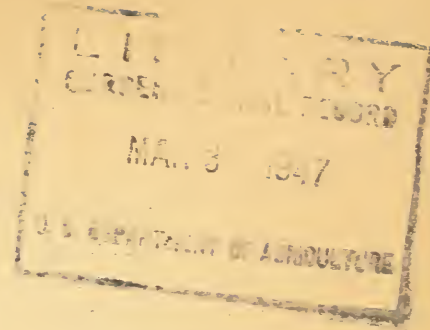
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Insects and Mites Recorded from Bamboo in the United States, with Records of their Distribution and Food Plants in Foreign Countries.

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Bamboo has been introduced and planted for ornamental purposes in the United States since the early period of plant introduction by the United States Department of Agriculture, but bamboo for commercial purposes has been limited to importations from the Orient. David G. Fairchild, who started the work on introduction of plants from foreign countries into the United States, introduced several species of bamboo into some introduction gardens in this country, where they became established and from where they have been distributed. In 1903 (15) he called attention to the possibilities of bamboo culture in the United States, discussed several species of bamboo and their culture in Japan, and suggested how their methods of cultivation might be applied to American conditions. He says, "The bamboo groves of Japan are not only one of the most striking features of its landscape, but one of its most profitable plant cultures..... It is a popular misconception that bamboos grow only in the Tropics. In regions where the snows are so heavy that they often break down the young stems and where the thermometer drops to 15° (F.) below the freezing point, the largest of the Japanese species grows and forms large groves."

Galloway (17) says, "We have no native bamboos worthy of the name, our nearest approach to the many varied and wonderful forms of other countries being the Arundinarias of the Southern States. There are two native species of Arundinaria, one the giant cane found in rich alluvial bottoms from Virginia to Kentucky and southward, and the other the so-called "switch" cane forming dense brakes and occurring from northern Virginia southward and westward through southern Ohio to southwestern Missouri." He relates the difficulties experienced in the early introduction of bamboos and says, "A great deal of valuable pioneer work has been done..... It appears that most of the forms likely to fit into our economic needs are already in this country. They are widely scattered and some of them are suffering from certain insects and diseases, probably brought in with them." Several species and their uses are discussed.

On the cultivation of bamboos in this country, McClure (21) says, "The cultivation of bamboo is so nearly universal in the tropical and warm temperate areas of the Orient that the correct procedures and techniques are common knowledge among the rural populations there. In the Western Hemisphere, however, plantings of bamboo are still so rare and so casually observed that its cultural requirements are known to relatively few people. Recently an extensive interest in bamboo from Western sources has been aroused as a result of the threatened depletion of our supplies of industrial bamboos from the Orient. The outcome promises to be a more general effort to cultivate bamboo in the Americas for domestic consumption.... While it probably will never attain equal importance (to that of the Orient) in the life of Western people, bamboo has demonstrated impressive potentialities for enriching the domestic economy of large areas of the Americas." The paper treats of the selection of species of bamboo for cultivation and methods of propagation.

McIlhenny (23) says: "The varieties of bamboo which can be grown satisfactorily in the area bordering the Atlantic Ocean from Savannah south, and extending all along the Gulf Coast inland to the point where the temperature in March does not drop below a couple of degrees of ice, are many.... bamboo wood is adaptable to many uses, from building houses to conversion into paper..... According to my observation, bamboo is the fastest growing plant known. A culm of Phyllostachys bambusoides or P. edulis that will measure four inches through at the base will make an average growth in a normal season of 18 inches in twenty-four hours, attaining its greatest growth during the warm part of the day. Maximum growth, of course, depends not only on proper temperature, but the proper amount of moisture in the atmosphere and in the ground, and a suitable amount of plant food to produce normal growth..... If scientifically cut, a bamboo forest will produce more pulpwood per acre per year than any other plant known."

The same author (24) says, "In China, the natural forests, as we in the United States know forests, have been exterminated for hundreds of years, and in many sections bamboo is the only available timber. It is in China that the growing and use of bamboo has reached its greatest development; and there it is used for every phase of human existence, from food to clothing and building material..... The young shoots of some varieties, as Phyllostachys edulis and P. henryi, are a delicious and nourishing food..... On every farm in the South where there is rich land and where the temperature does not fall below 15 degrees Fahrenheit a bamboo forest would be a good investment."

R. A. Young (34, 35), who is an authority on bamboo, gives in a series of articles a detailed account of the species of bamboo that have been introduced into this country. These articles are beautifully written and well illustrated.



With the increasing interest in bamboo culture in this country, insects injurious to the plant assume an ever-increasing role in its production.

The following list of insects and mites that attack bamboo has been compiled from records in the files of the Insect Pest Survey. These records were received from various sources, including reports from the collaborators of the Insect Pest Survey, from correspondents of the Bureau of Entomology and Plant Quarantine, from reports made by the inspectors of the Division of Foreign Plant Quarantines of the Bureau in conducting a wartime project known as a special survey in the vicinity of ports, 1943-45, and from the literature.

For the sake of brevity, no attempt has been made to cite all of the sources of the reports. Only the important bibliographical references, or those on insects having only a few references, have been cited. Further and more detailed information on some of the insects is available in the Division of Insect Pest Survey and Information, Bureau of Entomology and Plant Quarantine, Washington, D. C.

#### Scale Insects

The most important group of insect pests of the bamboo plant in the United States belong to the family Coccidae.

Asterolecanium bambusae (Boisd.) introduced on bamboo from the Orient, is the most common and injurious insect pest of bamboo in the United States. The occurrence of the insect in this country was first recorded by Barber (5) in 1911 in Louisiana. Records of its attack on bamboo growing outdoors have since been received from South Carolina, Florida, and westward in the Gulf States to Texas, and from California. This scale has been found on bamboo growing in greenhouses in New York, Pennsylvania, Illinois, Missouri, and in Washington, D. C. Many articles in the literature and unpublished reports in the files of the Insect Pest Survey indicate that the insect occurs on bamboo wherever it is grown in the tropical and subtropical world. Arundinaria spp., Bambusa spp., Dendrocalamus latiflorus, D. strictus, Gigantochloa aspera, G. scribneriana, Phyllostachys spp., and Oxytenanthera abyssinica have been recorded as host plants.

Asterolecanium bambusicola Kuw. was taken on bamboo at New Orleans, La., on March 9, 1919, and at Ocean Springs, Miss., on April 12, 1929. This scale was introduced into the United States from the Orient, where Bambusa sp. and Phyllostachys bambusoides are attacked (28, pp. 49-50). The species has evidently become acclimated to its new environment, as specimens were taken by the inspectors of the Special Survey in the Vicinity of Ports in southern Mississippi in 1944, and in southern Louisiana in 1944 and 1945.

Asterolecanium hemisphaericum Kuw. was first discovered in the United States in May 1916 (32), when specimens were taken on bamboo growing in a nursery at Riverton, N. J. The bamboo had been imported from Japan several years previously and the insect was well established. According to Russell (28) pp. 104-105, the insect infests Arundinaria chino and Phyllostachys sp. in Japan and China.

Asterolecanium miliaris miliaris (Boisd.) was taken on bamboo in Florida in 1918. It was later taken on bamboo in greenhouses in Illinois. Many records from the literature indicate that this insect infests many species of Bambusa and Dendrocalamus giganteus over much of the tropical world, including Bermuda, the West Indies, Canal Zone, and some countries of South America.

Asterolecanium miliaris robustum Green was recorded from bamboo in several places in southern Florida (25, pp. 276-277), under the name of A. miliaris logum (Green). This scale occurs on many varieties of bamboo in much of the tropical world including Bermuda, the West Indies, Canal Zone, and some countries of South America. (28, pp. 123, 130).

Asterolecanium pseudomiliaris Green was taken on bamboo in Florida in 1919 and sent to the Bureau of Entomology for identification. Specimens also have been received from a greenhouse in Chicago, Ill. This insect occurs commonly on Arundinaria spp., Bambusa spp., and Dendrocalamus strictus over much of the tropical world. The West Indies, Central America, and some countries of South America have records of the occurrence of the insect.

Aclerda arundinariae McConnell was originally described from specimens taken on Arundinaria tecta at Anderson, S. C., in 1940-1942 (22). The only other records of its occurrence were made by the inspectors of the Special Survey in the Vicinity of Ports at Charleston, S. C., and at Savannah, Ga. in 1944.

Aclerda tokionis (Ckll.) was originally described from specimens taken on bamboo plants from Japan being imported into San Francisco, Calif. (7). The scale was discovered in February 1899 on bamboo growing on the campus of Stanford University in California (20). This is the first record of the establishment of the insect in this country. Japanese literature records it from Phyllostachys bambusoides in Japan.

Antonina crawi Ckll. was originally described in 1900 from specimens taken on bamboo plants from Japan about to be landed at San Francisco, Calif. (8). It is not known when the scale became established, but Essig (10 pp. 108-109) in 1913, stated that it was common in gardens and greenhouses in central and southern California. He also stated that it was rather injurious when abundant. When the scales are young they are found on the leaves and tender growth of the plant, but when mature they cluster in the leaf axils. Weiss (31) found the insect on August 6, 1915, causing considerable injury to bamboo (Bambusa aurea and B. henonis) that had been imported from Japan and planted out of doors in a nursery at Riverton, N. J. Specimens from bamboo



in California and South Carolina were received by the Bureau of Entomology as early as 1911, and since that time specimens have come from New York, Louisiana, Texas, and the District of Columbia.

Chaetococcus bambusae (Mask.), a species introduced from the Orient, was first discovered in this country in 1908 on the Department of Agriculture grounds, Washington, D. C.. It was taken in Los Angeles County, Calif., in 1914. In 1931 it was found on bamboo at the Plant Introduction Station at Bell, Md. It is of common occurrence in southern California. Distribution outside of the United States includes the West Indies, Brazil, India, Ceylon, Mauritius, and Hawaii. The food plants include Bambusa arundinacea, B. tulda, and Dendrocalamus giganteus.

Kuwanaspis howardi (Cooley) was first found in the United States in 1911, when specimens were taken on bamboo from Japan planted in a nursery at Riverton, N. J., (30). The record was published under the name of Leucaspis bambusae Kuw. Cooley (9) originally described the species from specimens taken on East Indian bamboo plants. K. howardi was identified by H. Morrison from specimens received by the Bureau in May 1943, from a correspondent, who stated that the insect had been taken on bamboo (Phyllostachys nigra henonis) at San Antonio, Tex. The correspondent also said that the bamboo had been planted several years ago, but that the insects had not been noticed before. The inspectors of the Special Survey in the Vicinity of Ports found the insect on bamboo in southern Louisiana, southern Mississippi, and at Savannah, Ga., in 1943 and in 1944.

Kuwanaspis pseudoleucaspis (Kuw.) was recorded by Wilson (33, p. 36) from the Plant Introduction Gardens at Brooksville, Fla. Several reports in the files of the Insect Pest Survey indicate that the insect infests bamboo in Charleston, S. C., in southern Mississippi, and in southern California.

Odonaspis penicillata Green was recorded by Barber (4) under the name of O. inusitata Green as having been taken on Bambusa argentea and B. taison in Audubon Park, New Orleans, La., in 1910. This is the first recorded occurrence of the species in the United States. Frequent reports of infested bamboo in Georgia, Alabama, Mississippi, Louisiana, and California, have been received by the Insect Pest Survey during the last 10 years. Foreign distribution includes India, Ceylon, and China.

Odonaspis secretus (Chll.) was first taken in the United States on bamboo in Audubon Park, New Orleans, La., in 1911 by Barber (5). In 1916 it was taken on Bambusa metake at Riverton, N. J., where it had become well established. The insect was thought to have been introduced from Japan several years previously (32). Other records of distribution include Hawaii, Samoa, and Japan.

Pseudococcus adonidum (L.), the long-tailed mealybug, was recorded by Merrill and Chaffin (25, pp. 293-294) from bamboo in Florida. This mealybug is widely distributed over the tropical and subtropical world on many varieties of plants growing out doors and in greenhouses everywhere. Bamboo has been recorded as a host plant in Florida only.

## Aphids

Myzocallis arundinariae Essig was originally described from specimens taken on bamboo in California (11, p. 302). The author states that specimens of this species were taken as early as 1911, but that they were misidentified as M. arundicolens (Clarke). He also says that specimens received from a number of localities throughout California after 1911 were unquestionably listed as the latter species. Several bibliographical references are cited in which the species is incorrectly named. Foreign distribution includes Japan and England. The food plants include Arundinaria spp. and Bambusa spp.

Myzocallis arundicolens (Clarke) was described as a new species from a plant called bamboo (Arundo sp.) taken at Berkeley, Calif. (6). Essig (11, pp. 305-310) says: "Clarke, in the original description gives bamboo (Arundo sp.) as the host. This plant was undoubtedly Arundinaria japonica, which is the common species infested on the campus, where the type specimens were taken." Japan and England are recorded as other places where this infestation occurs on Bambusa spp., Pseudosasa japonica, and Sasa sp.

Anuraphis arundinariae Tissot was originally described from specimens taken on Arundinaria tecta at Gainesville, Fla., on April 16, 1930 (29).

Dryopeia morrisoni Baker was originally described from specimens taken on Phyllostachys sp. in Maryland on March 21, 1916 (2).

## Thrips

Chirothrips spiniceps Hood was originally described (19) from specimens taken on sugarcane in Arizona in 1913, in sweepings in Texas in 1905, 1906, 1910, and 1914, and on privet and bamboo in Louisiana in 1914. The insect was also recorded from sweet corn and Johnson grass in Texas. It has been commonly labeled as "C. obesus Hinds" in collections. Andre (1) records the States of North Carolina, Virginia, and California as additional places of distribution for the species.

## Miscellaneous Insects

Harmolita bambusae Phillips, a chalcid, was originally described from specimens taken in the spring of 1933 on an undetermined species of bamboo recently introduced into the Bamboo Gardens at Savannah, Ga. (27).

Harmolita phyllostachnitis Gahan was originally described from specimens taken on Phyllostachys bambusoides at Brocksville, Fla., in 1918 and 1919 (16). The larvae live in the young stems and emerge as adults in the spring. The insect is thought to have been introduced into Florida with bamboo from Japan.



Crocidophora pustuliferalis Lederer, a pyralid, was first noticed in the United States in 1937 in the Plant Introduction Gardens at Savannah, Ga., where it was causing considerable damage to bamboo. Since that time the insect has been reported infesting native and introduced bamboos from North Carolina southward to Florida and westward in the Gulf Coast States to Louisiana.

Lyctus brunneus (Steph.) and L. parallelipedus (Melsh.), powder post beetles common in timbers in the United States, are frequently found in bamboo articles of commerce.

Dinoderus minutus (F.), a bostrychid, is one of the best known insects infesting bamboo articles of commerce.

Chlorophorus annularis (F.), a cerambycid, frequently taken in the United States in articles of commerce made of bamboo in the Orient, is a serious pest of bamboo in Japan and India.

Prionus sp., a cerambycid, was recorded by Middleton (26) as infesting a grove of bamboo at Burroughs, Ga.

Horistonotus uhleri Horn was reported by Gibson (18) as feeding on the roots of a wild bamboo. This wireworm occurs in light sandy soils in the South Atlantic and Gulf Coast States.

Stephanoderes sp., a scolytid, was found attacking Bambusa tulda in the Plant Introduction Gardens at Brooksville, Fla., in February 1919, according to a report by a worker of the Bureau.

#### Mites

Schizotetranychus latitarsus Ewing was originally described from specimens taken on bamboo in southern California (12). This mite was also discovered on bamboo in the Plant Introduction Gardens at Brooksville, Fla., by workers there at about the time it was found in California. It is thought to have been introduced with bamboo plants from Japan. A mite identified by E. A. McGregor as Schizotetranychus sp., possibly latitarsus Ewing, was taken on bamboo (phyllostachys sp.) in southern Louisiana by the inspectors of the Special Survey in the Vicinity of Ports in 1944.

Schizotetranychus sp. was taken on Arundinaria pygmae in a greenhouse of the Plant Introduction Gardens at Savannah, Ga., in March 1927.

Stigmaeopsis celarius Banks was originally described from specimens taken on Bambusa metake in Florida (3). The mite also occurs in California. It lives in colonies under small, white webs on the leaves of the bamboo.

Tarsonemus phyllophorus Ewing was originally described from specimens taken on Phyllostachys bambusoides at the Plant Introduction Gardens, Brooksville, Fla. and from specimens sent from Yokohama, Japan. (13). In 1939, Ewing (14, pp. 47-48) gives further information on the mite, saying that specimens were taken at Brooksville, Fla. by David Fairchild on March 24, 1917. The mite was taken in 1944 on P. bambusoides at Savannah, Ga. by the inspectors of the Special Survey in the Vicinity of Ports. This is the mite referred to by Middleton (26) as T. bambusarium Banks, which appears to be a manuscript name.

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